LIBRARY
JUN 25 1942
DARTMOUTH COLLEGE

Vol. 19, No. 6 JUNE, 1942

AMERICAN JOURNAL OF OPTOMETRY *and* ARCHIVES *of* AMERICAN ACADEMY OF OPTOMETRY

EDITORIAL COUNCIL

R. J. BEITEL, JR.
HOWARD C. DOANE
GLENN A. FRY
A. P. WHEELOCK
J. FRED ANDREAE
G. O. OHLSSON
D. R. PAINE
E. LEROY RYER

ASSOCIATE EDITORIAL REFEREES

R. E. BANNON
BRANT CLARK
M. THOMA EBERL
WM. FEINBLOOM
RICHARD M. HALL
E. E. HOTALING
D. G. HUMMEL
O. J. MELVIN
FRANK K. MOSS
J. NEUMUELLER
E. PETRY
CHARLES SHEARD

EDITORS

CAREL C. KOCH

GUY L. DUPLESSIS CLARENCE W. MORRIS

COLLABORATORS

A. N. ABBOTT, *Shawano, Wis.*
E. ALLGAIER, *Washington, D. C.*
F. L. AVERA, *Los Angeles, Calif.*
J. O. BAXTER, JR., *New Bern, N. C.*
J. O. BAXTER, SR., *New Bern, N. C.*
R. C. BAXTER, JR., *Warren, Ohio*
R. T. BEST, *Fairmont, Minn.*
F. W. BROCK, *Staten Island, N.Y.C.*
W. I. BROWN, *New Bedford, Mass.*
J. ROBINSON COHEN, *New York, N.Y.*
I. H. DRAKEFORD, *New York, N. Y.*
ISRAEL DVORINE, *Baltimore. Md.*
T. H. EAMES, *Arlington Center, Mass.*
R. H. EHRENBERG, *Granite Falls, Minn.*
V. ELLENBROCK, *Columbus, Ohio*
T. A. W. ELMGREN, *Columbia, S. C.*
A. B. EMMES, *International Falls, Minn.*
WARD H. EWALT, JR., *Pittsburgh, Pa.*
W. S. FARMER, *Oklahoma City, Okla.*
H. M. FISHER, *New York, N. Y.*
L. P. FOLSOM, *South Royalton, Vt.*
H. L. FOUG, *Los Angeles, Calif.*
H. K. FULKERSON, *Somerset, Ky.*
M. FURMAN, *New York, N. Y.*
W. GASSON, *Watford Herts, Eng.*
W. H. GLAZER, *Philadelphia, Pa.*
J. G. GOODSELL, *Los Angeles, Calif.*
P. B. GOSS, *Philadelphia, Pa.*
N. GREEMAN, *San Antonio, Texas*
R. GREENSPOON, *Beverly Hills, Calif.*
W. GREENSPOON, *Bluefield, W. Va.*
H. GRUMAN, *Lebanon, Pa.*
HOWARD F. HAINES, *Columbus, Ohio*
W. J. HEATHER, *Southbridge, Mass.*
E. A. HUTCHINSON, *Los Angeles, Cal.*
O. H. JOHNSON, *Jonesboro, Ark.*
J. CLAIRE KEHOE, *Flint, Mich.*
L. H. KRASKIN, *Washington, D. C.*
E. W. LARSON, *Hibbing, Minn.*
A. R. LAUER, *Ames, Iowa*
C. J. LOOSER, *Lodi, Calif.*
M. LUCKIESH, *Cleveland, Ohio*
G. A. MACELREE, JR., *Philadelphia, Pa.*
A. H. MALIN, *Philadelphia, Pa.*
H. B. MARTON, *Manchester, Eng.*
D. J. MAYER, *Riverside, Calif.*
W. A. MEYER, *Sacramento, Calif.*
LEO J. MILLER, *Lincoln, Nebr.*
H. MOLISH, *Columbus, Ohio*
RAY MORSE-PECKHAM, *Detroit, Mich.*
H. G. MOTE, *Columbus, Ohio*
JOHN C. NEILL, *Philadelphia, Pa.*
C. R. PADELFORD, *Fall River, Mass.*
G. A. PARKINS, *Ord, Nebr.*
J. I. PASCAL, *New York, N. Y.*
HARRY E. PINE, *Chicago, Ill.*
H. S. PLAYER, *Stockton, Calif.*
E. E. REESE, *Westerville, Ohio*
A. R. REINKE, *Oakland, Calif.*
EARL R. RIDGEWAY, *Trenton, N. J.*
S. H. ROBINSON, *Prescott, Ariz.*
CHARLES I. SAKS, *Syracuse, N. Y.*
S. H. SHURIN, *Kansas City, Mo.*
R. SIMPSON, *Pasadena, Calif.*
S. W. SMITH, *Philadelphia, Pa.*
WILLIAM SMITH, *Boston, Mass.*
M. STEINFELD, *Paducah, Ky.*
K. B. STODDARD, *Berkeley, Calif.*
W. J. TAIT, *Philadelphia, Pa.*
S. A. TITUS, *Kansas City, Mo.*
R. N. WALKER, *Winston-Salem, N. C.*
NEILL WARREN, *Los Angeles, Calif.*
E. G. WISEMAN, *Buffalo, N. Y.*
ARENE T. WRAY, *Los Angeles, Calif.*
NORMAN Z. ZEVIN, *Lehighton, Pa.*

Published Monthly by the AMERICAN JOURNAL OF OPTOMETRY PUBLISHING ASSOCIATION,
1501 Foshay Tower, 821 Marquette Ave., Minneapolis, Minn.

ANNUAL SUBSCRIPTION $4.00 CANADA $4.50, FOREIGN $5.00
Single copies, 50c

Entered as second-class matter February 20, 1924, at the postoffice at Minneapolis, Minnesota.
under the Act of March 3, 1879.

U. S. PAT. 131671

A Lovely Saleswoman for a Lovely Frame

This distinctive 14x18½, eight color display card is as timely and attractive as the Wingers it advertises.
Beautifully executed and rich in attention value, it will be a pleasing addition for your window or show case.
Your jobber has one for you.

REMEMBER—*WINGERS* ARE KONOPTICS

AMERICAN ACADEMY OF OPTOMETRY

Dr. Arthur P. Wheelock, *President*
Des Moines, Iowa

Dr. Curtis R. Wells, *Vice-President*
Boston, Mass.

Dr. J. Fred Andreae, *Secretary*
Baltimore, Md.

EXECUTIVE COUNCIL

Dr. Arthur P. Wheelock, *Chairman*
Des Moines, Iowa

Dr. Curtis R. Wells, *Vice-Chairman*
Boston, Mass.

Dr. J. Fred Andreae, *Secretary*
Baltimore, Md.

Dr. W. Edward Dewey
Battle Creek, Mich.

Dr. Wm. Greenspoon
Bluefield, W. Va.

Dr. Harold Fisher
New York, N. Y.

Dr. Glenn Winslow
Los Angeles, Calif.

Office: American Academy of Optometry: 901-903 Lexington Bldg., Baltimore, Md.

The AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF THE AMERICAN ACADEMY OF OPTOMETRY serves as the official publication of the American Academy of Optometry. It is published monthly by the American Journal of Optometry Publishing Association under the editorial supervision of the American Academy of Optometry.

Publication Office: 1501-1504 Foshay Tower, 821 Marquette Ave., Minneapolis, Minn.

AMERICAN JOURNAL OF OPTOMETRY
and ARCHIVES *of*
AMERICAN ACADEMY OF OPTOMETRY

Vol. 19 — CONTENTS — No.

Page

ORIGINAL PAPERS

Practical Aspects of Aniseikonia. Robert E. Bannon 239

A Summary of the Cases Examined in the Eye Clinic of the New Jersey State Colony at New Lisbon. Earl H. Ridgeway 261

EDITORIALS

Absolute Near Tests. E. LeRoy Ryer and Elmer E. Hotaling 270

TRANSACTIONS OF THE ACADEMY by J. Fred Andreae 273

INQUIRY AND EXPLANATORY NOTES

No Immediate Shortage of Plastics for Spectacle Frames. Florence Kono . . . 275

BOOK NOTICES 277

CURRENT COMMENTS by Carel C. Koch 278

O.K.

Thousands of Visual Impressions are back of every O.K. in Victory Production!

Did you ever think of how many human minds and hands contribute to even the simplest implement of war? Or how many eyes and visual impressions guide the thinking and working of those responsible for this production? Or how costly can be the mistakes caused by overstrained or subnormal eyesight? You're doing your important bit for America when you supply correction based on your skilled study, and on products of unquestionable optical merit—such as Bausch & Lomb Orthogon,* Panoptik,* Loxit (the B&L molded rivet mounting).

**In Soft-Lite, too*

Bausch & Lomb

OPTICAL COMPANY • ESTABLISHED 1853

"What Can I Do To Schickelgruber?"

YOU CAN DO PLENTY! Nobody needs to mope today because he's too old for combat service.

Producers are as indispensable as fighters in this titanic struggle. Supreme effort will be required from all of us to supply the engines of victory.

Every man, every woman, needs to be tuned to fighting pitch for this do-or-die job. Personal condition is of the essence—condition of mind and body.

Most important, your eyes, which control 80% of your actions.

Good eyes perceive quickly, guide hands nimbly and surely, conserve nervous energy, keep you producing at tops.

Defective eyes tire fast, see double, cause fumbling and accidents, lose time, destroy material, soon exhaust nerves, brain and body.

If you really want to do things to Adolph Schickelgruber and Hirohito the Wasp, check up first on your eyes. Nearly one-third of all Americans have *uncorrected* faulty vision.

Don't experiment with slipshod eye care. There are truly capable men in your community to whom you can trust your precious eyesight. Select one of them. He will make a scientific analysis of your individual defects of vision and provide professional correction and care.

Go to him. Tune up your eyes for the victory drive. Better Vision Institute, Inc., 630 Fifth Avenue, New York.

VISION FOR VICTORY

★ ★ ★ ★ ★ ★

First Message in the New BVI Public Relations Program

Watch for the Better Vision Institute Bulletin giving full details

CONGRATULATIONS BVI!

Optometrists, Ophthalmologists, and Ophthalmic Dispensers, too!

With deep sincerity, we congratulate Better Vision Institute on the excellent educational program, "Vision for Victory," about to appear in the nation's leading magazines. We also congratulate every member of the Ophthalmic Professions on the benefits which must certainly result from this timely and farsighted endeavor.

This new activity of BVI is particularly gratifying to us because, as one of the pioneer sponsors of the Institute, we have looked forward to a nationwide public relations program.

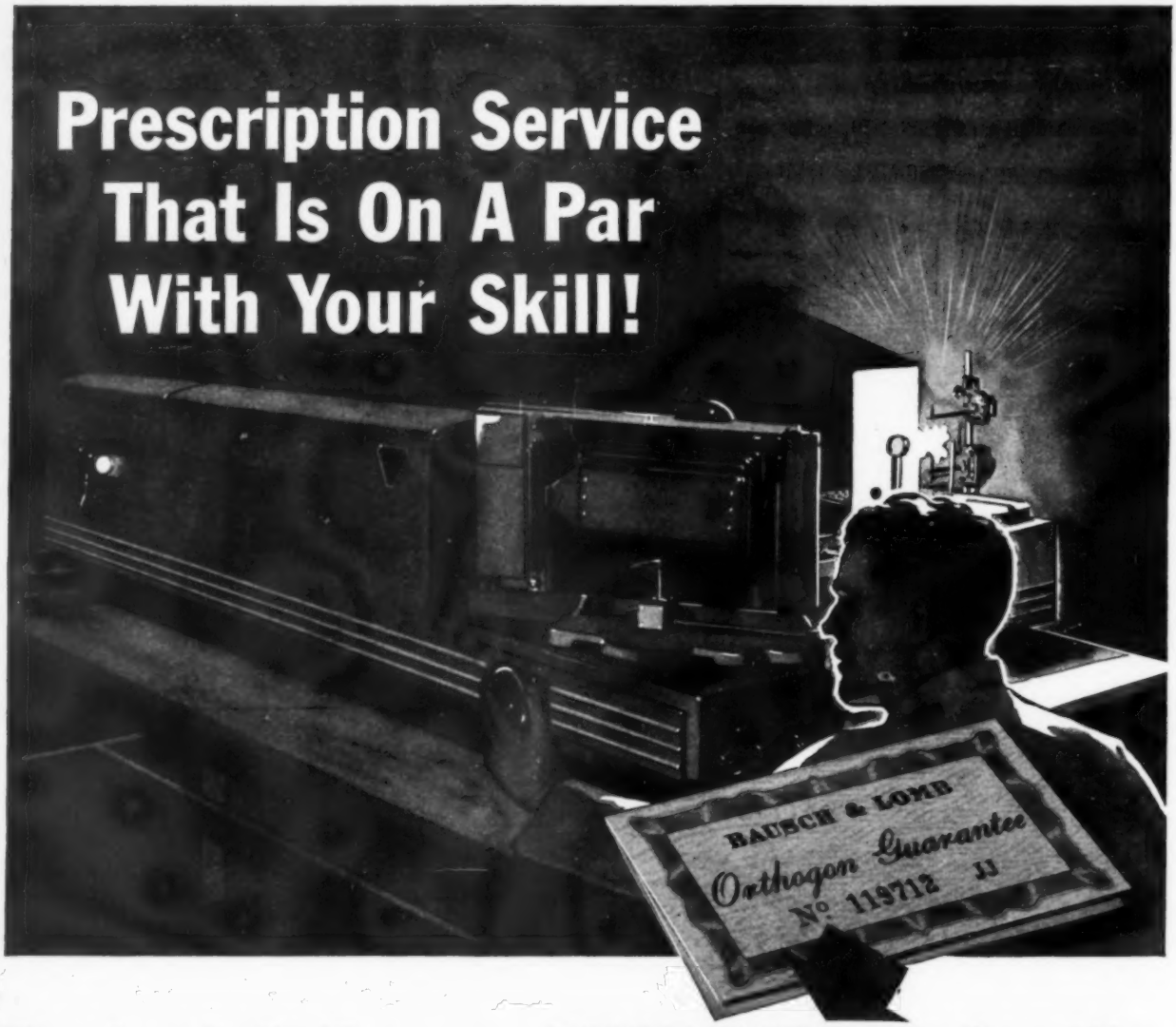
We have gladly contributed a substantial sum to this program because we believe it merits the good will, support, and full cooperation of all who have at heart the best interests of the ethical Ophthalmic Professions.

THE American Optical COMPANY

VISION FOR VICTORY

SUBSCRIBER — Special Institute Victory Fund
SPONSOR — Vision for Victory Campaign

Prescription Service That Is On A Par With Your Skill!



Back of Orthogon GUARANTEED Quality

Stands the Constant Research of Scientific Laboratories

You examine each patient with all the skill at your command.

For your patient to receive the complete interpretation of your exacting refraction he should have Riggs GUARANTEED QUALITY prescription service.

Orthogon, Panoptik, Soft-Lite, Ray-Ban, Balcor and Loxit are products which have kept pace with, in fact are children of, scientific research.

These products, used for Riggs GUARANTEED QUALITY prescription service, carry the Bausch & Lomb guarantee. That means they are first quality in every detail; that they fulfil to the highest possible degree the purpose for which they were created.

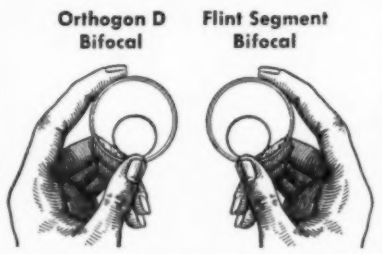
They are pillars of strength for you to use in building and maintaining your practice.

This GUARANTEED QUALITY prescription service is available through all Riggs offices.

RIGGS OPTICAL COMPANY

Distributors of Bausch & Lomb Products

General Offices, Chicago, San Francisco; Branches in Principal Western and Mid-Western Cities



THEY LOOK ALIKE . . .

But their optical performance and quality are entirely different.

Prescribe Orthogon D for three patients and allow their enthusiasm to demonstrate that Orthogon D is a firm foundation upon which to build your practice

AMERICAN JOURNAL OF OPTOMETRY
and ARCHIVES *of*
AMERICAN ACADEMY OF OPTOMETRY

Vol. 19 JUNE, 1942 No. 6

PRACTICAL ASPECTS OF ANISEIKONIA*

Robert E. Bannon
Dartmouth Eye Institute
Hanover, N. H.

I. *Introduction*

There have been many papers written and published in the last fifteen years on, or relating to the subject of Aniseikonia (the inequality in size and/or shape of the ocular images), and yet many general practitioners, as well as specialists, are not familiar with this advance in ocular science which, besides being of considerable interest to the research man, is of great clinical importance. At least five thousand patients have been examined for aniseikonia; most of these have been given iseikonic corrections and a large percentage of the latter have had remarkable relief. Symptoms which persisted despite thorough medical and refractive therapies have been successfully relieved when an existing difference in the relative size of the ocular images had been corrected with special ophthalmic lenses.

In considering what, to some, may seem an appalling lack of interest and knowledge in scientific progress, one is reminded of the part that astigmatism played, about fifty years ago, in the diagnosis and treatment of visual difficulties. Although Thomas Young, in 1793, reported his interesting experiments on his own case of astigmatism[1] and even though mention is made here and there in the scientific literature of a hundred years ago of this anomaly called "astigmatism," it was not until nearly the beginning of the twentieth century that widespread attention in this country was given to the use of cylindrical lenses for the correction of astigmatism. Fifty years ago, only a few men in this country were well versed in the technique of determining and correcting astigmatism —and it is a matter of record that some of them used to travel hun-

*An abridgment of the material presented before the American Academy of Optometry, at Chicago, Illinois, December 7, 1941, for publication in the June, 1942, issue of the AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF AMERICAN ACADEMY OF OPTOMETRY.

dreds of miles to examine the cases that the local practitioners had saved up for them. Skepticism of the value of correcting astigmatism was then rampant, more so than it is today with respect to aniseikonia; yet now the correction of astigmatism is universally accepted as a matter of course, with little thought to the controversies which occupied our predecessors of only the past generation.

In considering the history and the time that elapsed before astigmatism was generally accepted, (and the same is true for many other scientific advances), one is not amazed at the present disposition of some men in the profession to be so slow in knowing more about this relatively new subject of aniseikonia.

II. *Definitions*

Aniseikonia is the relative difference in size and/or shape of the *ocular* images. The words "ocular images" mean the resultant cumulative images produced, not only by the retinal images and the dioptric factors involved, but also by the modifications imposed on the retinal images by the neurological elements which transmit the retinal images to the visual centers in the cortex and to consciousness. There are, of course, normal or physiological differences in the relative size of the images; for instance, in certain secondary directions of gaze where such differences are necessary in order to establish one's position in space with reference to the objects fixated.[2] These normal geometric or dioptric differences in image size should not be confused with aniseikonia, since the latter is an error, an incongruity in image size, existing over and above the physiologic relationship in image size consistent with the position in space of the object viewed.

III. *Clinical Importance*

The binocular anomaly of a difference in the relative size of the ocular images is a burden on the fusion faculty, much the same as is a heterophoria. In the latter case, if the fusional amplitudes are adequate, an individual will not see double or have any subjective symptoms. The same is true with respect to aniseikonia; if the added load is within the individual's tolerance, he will be able to fuse the unequal images without any symptoms. If, however, the tolerance of the individual is not sufficient and his fusional amplitudes are inadequate, he will not be able to fuse the unequal images with comfort, but will experience the well-known asthenopic symptoms and headaches on the use of the

eyes over any appreciable period of time. If the relative difference in the size of the ocular images is large enough and the fusional amplitudes depleted, the individual will either see double or will learn to suppress one of the images.

How much of a disparity in the relative size of the ocular images will cause trouble to one person and not to another is dependent, as it is in the case of the phorias, on the quality of the fusional amplitudes and the tolerance of the individual.

The most important criterion in evaluating the clinical importance of aniseikonia is that its correction has enabled patients to do a normal amount of eye work without asthenopic symptoms, whereas previously they were unable to use their eyes with comfort. Headaches, dizziness, fatigue, photophobia, nervousness, general eye discomfort and inefficiency have been relieved in a large number of cases when other therapy had failed by the correction of a measurable aniseikonia.

It is well known that in many cases of anisometropia of over two diopters, it is impractical, by ordinary refractive means, to give a full correction for both eyes, since experience has shown that by so doing the patient is often uncomfortable, complaining of eye-strain, headaches and even diplopia. It is generally considered that the different prismatic effects produced by lenses of markedly unequal powers away from their optical centers are responsible for the patient's discomfort. However, many cases of marked anisometropia can be fully and comfortably corrected without the use of prisms if, in addition to the refractive prescription, a correction is given for any measured difference in the relative size of the ocular images.

One should not consider aniseikonia to be present only when there is a difference in the refractive correction for either eye; neither can one conclude indiscriminately, from the nature of the anisometropia, which eye receives the larger image. It is true, within certain limits, that the correction for the more hyperopic, or less myopic eye will introduce a larger *retinal* image, *provided* the ametropia is due to refractive and not to axial factors. Unfortunately, there is no way of knowing, unless the patient dies or his eyes are enucleated, whether or not the refractive error is dioptric or axial and it is therefore necessary to measure each individual patient for the resultant effect produced by the unequal refractive correction.

In their paper, "Relationships Between Aniseikonia and Ametropia,"[3] Carleton and Madigan pointed out that, although 69% of the cases they studied were anisometropic which therefore suggested the possibility of concomitant aniseikonia, nevertheless, the correlation was such that no arbitrary deduction could be made as to the possible amount of aniseikonia in any specific case. They also mention, as does Hughes,[4] that, since significant aniseikonia has been measured in cases of bilateral emmetropia and equal ametropia (isometropia), it is evident that aniseikonia can exist irrespective of the amount and nature of the refractive condition.

Fisher[5] reports that a statistical study made on 836 patients with anisometropia of less than two and one-half diopters showed that 90% had aniseikonia; in cases of anisometropia of over two and one-half diopters, all had aniseikonia. He pointed out, however, that, although there appeared to be a relationship between the *incidence* of anisometropia and aniseikonia, it was impossible to deduce from the amount of anisometropia present precisely what would be the resultant difference in the relative size of the ocular images.

The following cases will illustrate the aforementioned points:

Case No. 1—Anisometropia with aniseikonia apparently introduced by the unequal refractive correction.

Case No. 2—Emmetropia with aniseikonia.

Case No. 3—Equal ametropia with aniseikonia.

Case No. 4—Anisometropia with aniseikonia opposite to that introduced by the unequal refractive correction.

CASE No. 1—Anisometropia and corresponding aniseikonia.

Dr. S. F., No. 5406, physician, age 31, when first seen on April 22, 1938, wearing:

R.E. +0.25 D. Cyl. x 90° =20/20
L.E. −3.00 D. Sph. =20/40

Symptoms and History: Frontal headaches and eye fatigue following short periods of reading (½ hr.) or driving (1 hr.). General health reported as good.

Ophthalmoscopy: Negative.

Refraction: R.E. +0.25 D. Sph. ⌒ −0.37 D. Cyl. x 180°=20/20
L.E. −3.50 D. Sph. =20/20

Muscle Balance: Distant: 1△ to 2△ Exophoria ⌒ ½△ R. Hyperphoria
Near: 2△ to 4△ Exophoria ⌒ ¼△ L. Hyperphoria
Depth perception in the stereoscope was of poor quality with evidence of some occasional suppression of L.E. image. Fusional amplitudes were high, and equal in the vertical meridian, but laterally a tendency toward convergence insufficiency was found.

Aniseikonia: L.E. 2.00% Overall mag.

Disposition: Correction was given for the refractive error and aniseikonia as follows:

R.E. +0.25 D. Sph. ⌒ −0.37 D. Cyl. x 180°
L.E. −3.50 D. Sph. ⌒ 2.00% Overall mag.

Report: After one month, the patient reported considerable improvement with the aniseikonic glasses. He had had no headaches or other discomfort, and depth perception seemed much better.

We have heard from the patient again this fall, and he reported that the three and a half years with the aniseikonic glasses had been very comfortable.

Summary: This is a case in which the aniseikonia was in the expected direction with respect to the anisometropia; the left eye (the more myopic eye) needing the magnification.

CASE No. 2—Emmetropia and aniseikonia.

Mrs. A.M.W., No. 579, housewife, age 35 when first seen on July 31, 1934, wearing no glasses.

Symptoms and History: For the previous 15 yrs., the patient suffered from ocular fatigue, photophobia and frontal headaches, especially after one-half hour of reading or after the movies. Repeated physical examinations were negative.

Ophthalmoscopy: Negative.

Refraction: Emmetropia O.U. (20/20 each eye).

Muscle Balance: ½△ Esophoria for distance.
2△ Exophoria for near.
Fusional amplitudes—normal.

Aniseikonia: L.E. 0.75% Overall mag. ⌒ 0.75% mag. x 90°.

Disposition: Correction for the aniseikonia.

Report: Relief from the ocular symptoms and the headaches, as well as improvement in general health. A letter from the patient states, "My glasses continue to be a great source of comfort to me and all my family were struck by the very apparent improvement in my health."

Summary: A case of emmetropia with aniseikonia; the correction of which relieved the patient's symptoms.

CASE No. 3—Equal ametropia with aniseikonia.

Mr. S.B., No. 636, physicist, age 23 when first seen on October 20, 1936, wearing, for reading:

R.E. +2.00 −0.25 x 180° =20/40
L.E. +2.00 −0.25 x 180° =20/40 O.U. 20/30

Symptoms and History: Severe frontal headaches and fatigue following one hour of reading or other close work. Had worn glasses for 15 yrs., last correction 2 yrs. previous. General health reported as good.

Ophthalmoscopy: Negative.

Refraction: R.E. +1.50 −0.50 x 180° =20/15
L.E. +1.50 −0.50 x 180° =20/15

Muscle Balance: Distant: ½△ Esophoria.
Near: Varying 4△ to 10△ Exophoria.

Fusional amplitudes exceeded normal limits at times but, when fatigued, there was evidence of some suppression, especially at the near point.

Aniseikonia: R.E. 4.00% mag. x 90°.

Disposition: We gave the patient our refractive correction with the 4.00% mag. x 90° on the R.E., and he has reported many times in the past five years that he has been very comfortable for extended periods of close work. He has tried to go without the size correction on many occasions, only to experience a return of his severe headaches.

Summary: This case is one of equal ametropia with a definite and large difference in the relative size of the ocular images, the correction of which has brought unequivocal relief from headaches.

CASE No. 4—Anisometropia with non-corresponding aniseikonia.

O.C.P., male, No. 13241, surgeon, age 43 when first seen on August 14, 1941, wearing:

R.E. +1.62 D. Sph. ⌒ −0.37 D. Cyl. x 180°=20/20+
L.E. +4.25 D. Sph. ⌒ −0.25 D. Cyl. x 45°=20/20
Add +1.00 O.U. in bifocals

O.U. 20/15

Symptoms and History: No discomfort, but the patient had frequently noticed at the near point an unequal focus of the two eyes. Had worn glasses about 25 yrs.; last prescription two yrs. previous. General health reported as excellent.

Ophthalmoscopy: Negative O.U.

Refraction: R.E. +1.50 D. Sph. =20/20
L.E. +4.50 D. Sph. =20/20 O.U. 20/15
Add +1.50 O.U. for near

Muscle Balance: Distant: 1△ Esophoria ⌒ 2△ L. Hyperphoria
Near: 5△ Exophoria ⌒ 2△ L. Hyperphoria

The lateral fusional amplitudes were within normal limits but the vertical amplitudes substantiated the 2△ of left hyperphoria.

Aniseikonia: L.E. 0.75% Overall mag.

Disposition: We gave the patient a prescription for our refractive correction and incorporated 2△ base-down on L.E. for the hyperphoria.

Report: After one month, the patient reported that with the new glasses, although the focus of each eye seemed balanced, he was more uncomfortable. He had resumed wearing his old correction and felt perfectly comfortable.

Summary: Although one would expect that the dioptric difference of 3.00 D. might produce a difference in the size of the image such that the right eye (the less hyperopic one) would have the smaller image, nevertheless, actual measurements showed that the other eye (the more hyperopic one) had the smaller image. It is also important to note that, even with the anisometropic correction, the patient had no symptoms and therefore an aniseikonic examination was not indicated; this, as it turned out, supported the belief that there was no significant size difference present.

In the extreme case of anisometropia, as represented by that of

unilateral aphakia, the results obtained by correction of the aniseikonia are most significant. It is well known that in a case of unilateral aphakia the mere correction of the refractive error of both eyes results in annoying diplopia, or the eventual suppression of one of the images and a strabismus, provided a heterophoria existed prior to the extraction of the cataract. However, when the difference in the relative size of the ocular images, as well as the refractive error are corrected, in these cases full binocular vision is regained, provided there are no other complicating factors, such as a tropia or an absence of the fusion faculty.

The increased fusion ability and depth perception reported by many patients corrected for aniseikonia further argue in favor of the role played by this anomaly in neuro-muscular binocular difficulties. The following cases will illustrate this point:

Case No. 5—Anisometropia, aniseikonia, poor depth perception.

Case No. 6—Emmetropia, exophoria, aniseikonia, diplopia.

Case No. 7—Anisometropia, esophoria, aniseikonia, no stereopsis.

CASE No. 5—Anisometropia, aniseikonia, depth perception.

Mr. P.T.N., No. 3608, sales clerk, age 36 when first seen on June 18, 1937, wearing:

R.E. −0.25 D. Sph.
L.E. −0.25 D. Sph. ⌒ −1.50 D. Cyl. x 43°

Symptoms and History: Headaches and asthenopic symptoms for many years; occasional diplopia and difficulty in judging positions of objects in space. Had worn glasses for about 25 yrs., with changes every year but no lasting relief. Physical condition reported as negative.

Ophthalmoscopy: Negative O.U.

Refraction: R.E. Plano 20/20
L.E. −1.50 D. Cyl. x 48° 20/20

Muscle Balance: Distant: 1△ to 3△ Exophoria.
Near: 7△ to 9△ Exophoria.

Normal fusional amplitudes, but poor depth perception in the stereoscope with occasional suppression.

Aniseikonia: R.E. 1.50% mag. x 90°.

Disposition: Prescription given as follows:

R.E. 0.00 ⌒ 1.50% mag. x 90°
L.E. 0.00 ⌒ −1.50 D. Cyl. x 48°

Report: Two months after the patient obtained the aniseikonic glasses, he reported relief from his symptoms and a most interesting improvement in depth perception. He stated that he no longer had to shift his head a few feet laterally in order to judge the relative position of objects in space; he was able to avoid bumping into furniture; he played a better game of squash; and made better judgments while skiing. The patient explained that his better judgment of the third dimension lasted only a few hours if he removed the glasses but returned in a few minutes when he resumed wearing the glasses. We substantiated the improvement in depth perception with the glasses by tests on the Keystone card.

We have heard from the patient every year for the past four years, and our last reexamination was on March 21, 1941, at which time our findings were essentially the same as those of our first examination. The patient has continued to enjoy his improved depth perception and freedom from symptoms.

Summary: This case is one in which, besides the relief from symptoms obtained with an aniseikonic correction, the patient experienced considerable improvement in depth perception.

CASE No. 6—Exophoria and aniseikonia.

Mr. F. L., No. 565, engineer, first seen on June 6, 1934, age 37, wearing:

R. E. Plano ⌒ 5△ Base-in
L.E. Plano ⌒ 5△ Base-in

Symptoms and History: Fatigue and frequent diplopia when reading. General health good. First glasses at age 9 and convergence exercises repeatedly advised.

Ophthalmoscopy: Negative.

Refraction: Emmetropia O.U. (20/15 each eye).

Muscle Balance: Distant: 18△ Exophoria.
Near: 28△ Exophoria.

Fusional amplitudes and near point of convergence were within normal limits despite the rather high exophoria.

Aniseikonia: R.E. 1.25% mag. x 90°.

Disposition: Prescription given, 1934:

R.E. Plano ⌒ 1.25% mag. x 90°
L.E. Plano

Report: Three months later, the patient reported no discomfort and no diplopia. The patient remarked that the aniseikonic correction, without prisms, was much more satisfactory than his former prismatic correction of 5△ Base-in O.U.

No further report was made by the patient until Sept. 26, 1941, when he returned for reexamination. He reported that, during the 7 year interval, he had been very comfortable with the aniseikonic correction but had recently noted that he had to hold reading matter at arm's length in order to see it clearly. He was now 44 years old, and our tests merely indicated that he now needed an add of +1.00 D. Sph. O.U.

Summary: Although, when tested, this patient had normal fusional amplitudes despite his high exophoria, it must be remembered that the fusional amplitudes were not always adequate because the patient complained of diplopia, especially when tired. However, with the aniseikonic correction, his increased fusional amplitudes enabled him to keep latent his divergence tendency as is shown by the patient's report that he no longer saw double when tired.

CASE No. 7—Esophoria and aniseikonia.

Miss I.D., No. 12562, student, age 15 when first seen on May 22, 1941, wearing:

R.E. −0.50 D. Sph.
L.E. −2.50 D. Sph.

Symptoms and History: Severe frontal and temporal headaches and fatigue when reading, with or without glasses. No serious illness other than usual children's diseases. First glasses at age of 12 because of poor vision in the left eye.

Ophthalmoscopy: Negative.

Refraction: R.E. +0.25 D. Sph. 20/15
L.E. −3.00 D. Sph. 20/15

Muscle Balance: Variable esophoria of 5△ to 10△ for distance and between 10△ to 14△ for near. No stereopsis could be obtained,

either with or without the refractive correction. Fusional amplitudes indicated excessive convergence.

Aniseikonia: L.E. 3.00% Overall mag.

Disposition: The following correction was given:

R.E. +0.25 D. Sph.
L.E. −3.00 D. Sph. ⌒ 3.00% Overall mag.

Rechecked: July 16, 1941, at which time patient reported complete relief from symptoms. The patient now had 100% stereopsis on the calibrated Keystone card and the tendency toward overconvergence was markedly reduced.

Summary: Several points are illustrated in this particular case. The aniseikonia was such as might be expected from the dioptric difference between the refractive correction for each eye, assuming the ametropia to be refractive rather than axial. Also, there was considerable esophoria, no stereopsis, and discomfort when reading; all of which were markedly improved once the relative difference in the size of the ocular images was corrected.

That an inequality in the relative size or shape of the ocular images is a factor in binocular vision affecting the correct localization of objects in space has been reported in several previous papers.[6] Aniseikonia produces misinterpretations of the positions of surfaces and objects in space through its effect on space perception. In general, normal binocular stereoscopic judgments are the result of a specific disparity between corresponding parts of the dioptric images formed in the two eyes with respect to retinal units having the same relative space values. When aniseikonia is present, this particular disparity is changed and, therefore, results in a misinterpretation of the position of surfaces and objects in space. It is true that an important clue other than the stereoscopic faculty for judging the position of objects in space is through perspective. This perspective basis of judgment is but slightly affected by aniseikonia.

A person who has a significant aniseikonia is constantly under the difficulty of making at least two quite inconsistent judgments in the position of objects in space; one, which originates in the use of perspective as the basis of his judgment and the other, which originates in the use of stereoscopic vision.

If an individual, having aniseikonia, is in an environment abounding in perspective clues (straight lines, regular patterns and right angles), he will have no trouble in judging with accuracy the relative position of the objects in view. However, if an individual, having aniseikonia, is subjected to an environment in which perspective factors are absent but in which many stereoscopic details are present, he will not be able to accurately judge the relative position of certain objects in view. In fact, a person with aniseikonia, in order to avoid the conflict presented by stereoscopic vision, may suppress one of the ocular images and resort to perspective (uniocular) vision.

The question is often asked: How much of a difference in the relative size of the ocular images is significant? The following table gives some interesting data:

	Aviation Cadets	*Students*	*Patients*
0 to 1% Aniseikonia	100%	70%	36%
1 to 2% Aniseikonia	0%	23%	55%
Over 2% Aniseikonia	0%	7%	9%

The data on the "Aviation Cadets" were obtained by members of the Dartmouth Eye Institute working at the U. S. Naval Station at Pensacola, Florida. It shows the average amount of aniseikonia found in 107 cadets. The "Student" group, numbering 341, was from the Class of 1940 at Dartmouth College, and the "Patients" were 100 consecutive individuals referred to the Dartmouth Eye Institute for aniseikonic examination because of their symptoms. It is apparent that in the highly selected group of flyers a much smaller amount of aniseikonia was found as compared to the students who were not so highly selected insofar as their eyes were concerned. None of the cadets had an aniseikonia of over 1% and the majority of the college students had an aniseikonia of less than 1%; it is these two groups which did not complain of symptoms. In the "Patients" group, there is a preponderant number with an aniseikonia of between 1% and 2%, and it is this group of individuals which had ocular complaints sufficient to be referred for the examination and correction of their visual problems.

In general, an aniseikonia of 1% or more is considered significant and its correction is warranted in cases of eye-strain, headaches, and other symptoms which seem associated with the use of the eyes.

It is true that one person may have an aniseikonia of 1% and not

complain of discomfort, whereas this same amount will seriously affect another individual. This should not be amazing since in cases of ametropia some individuals with a refractive error of one diopter do not complain of discomfort, while to others the correction of one diopter of ametropia affords relief from most distressing symptoms. In fact, the correction of one-half diopter of astigmatism or hyperopia has relieved some patients of significant symptoms; likewise, some highly sensitive individuals have reported beneficial effects with a correction of 0.75% aniseikonia.

IV. *Factors which may lead one to suspect aniseikonia*

(a) Symptoms unrelieved.
(b) Anisometropia.
(c) Unequal accommodation.
(d) Unequal curves or thickness of lenses.
(e) Space perception anomalies.
(f) Preference of monocular vision.

It is a classical question to ask a doctor, if he could have only one choice, whether or not he would choose the privilege of attempting diagnosis and treatment by virtue of the symptoms alone, or by the most complete mechanical equipment available. Most men have replied that they would prefer to have the history and symptoms rather than all the instrumentation that science can provide.

Rarely is a man able to make every possible test indicated as necessary by his patient's symptoms. In a great many cases, however, one is able with the instrumentation at hand, to adequately cope with the usual run of patients. In even the best practices there are cases which, despite the most accurate refractive correction, despite correction for a heterophoria and despite the most assiduous orthoptics, continue to experience discomfort in the persistent use of the eyes. It is these cases which may be suspected of having an aniseikonia unless their physical condition is sufficiently at fault to explain their symptoms.

One's suspicion of a possible difference in the relative size of the ocular images is further aroused by the presence of an anisometropia in addition to the unrelieved symptoms although, as previously mentioned, the character of the anisometropia does not always indicate the kind and amount of aniseikonia.

Unequal accommodation, whether due to a unilateral paresis of

the neuro-muscular mechanism or to a congenital or a traumatic anomaly, is another clue to the possible existence of an aniseikonia, regardless of whether or not the difference in accommodation is corrected by refractive lenses.

Occasionally, one finds that a prescription has been filled by an indiscriminate choice of front curves. If, for example, a refractive correction differing for each eye by only a half diopter is made with lenses the front curves of which differ by more than a half diopter, there is introduced an unequal magnification which will cause an unnecessary discrepancy in the relative size of the retinal images. By merely matching the front curves as nearly as the difference in refractive power of either eye will permit, many cases of aniseikonia produced by the refractive correction may be avoided. It may even be advantageous, in certain cases, to omit a small astigmatic correction for one eye in order to more nearly match the curves and thickness of the two correcting lenses.

We are all familiar with patients who, having worn a refractive correction for the first time, immediately reported that their previous mode of spatial localization was upset. The hyperope with his first correction may complain that objects seem nearer and larger to him than formerly; he may also remark that he feels like a dwarf, that he does not seem to be as tall as he used to be; the myope with his new objects no longer seem tall and thin but are now "squatty." Patients who require oblique cylinders often have the greatest difficulty in becoming adapted to their new corrections. These various subjective observations, annoying as they may be to the individual for a few days, are often normal reactions and, provided the proper advice is given, are tolerated in the expectation of the eventual relief of the more serious symptoms of headaches and eye-strain. It is not difficult to reconcile some patients with the explanation that the cost of the removal of their long-standing symptoms is the tolerance for a few days of a new mode of orientation; but, if after a few days or even weeks the symptoms have not lessened and the distorted appearance of objects in space persists, it is no wonder that such patients naturally become concerned about their condition and seek advice and treatment anew. It is such patients who experience persistent disturbances in their space perception and whose symptoms are not relieved who must be closely watched and very likely advised to have a thorough examination for aniseikonia.

correction often reports the opposite observation; the person having "with-the-rule" astigmatism may remark that with his new glasses

Since aniseikonia, like heterophoria, is an anomaly of the binocular apparatus, it is not unusual and it is of diagnostic importance, that some patients report they can read, watch a movie or a football game much more comfortably with one eye closed or covered. When a patient reports this pertinent information, there can be no doubt that there is some obstacle, either a heterophoria or an aniseikonia, interfering with the neuro-muscular operation of the two eyes in binocular vision.

Marlow[7] and others have collected considerable data which show, that in cases of persistent asthenopia and headaches, the occlusion of one eye for several days often results in a cessation of symptoms and, what is more important, a significant muscle imbalance is often manifest on removing the occluder. In suspected cases of aniseikonia, the occlusion of one eye for several days may also be of diagnostic importance. One must be extremely careful, however, in using the prolonged occlusion test, that one does not make radical and unwarranted conclusions. In the first place, it is of little or no value to advise the covering of one eye for only a few hours a day, or even constantly for a day or two. In order for the test to be conclusive, one must advise occlusion for at least two weeks. Of course, the severity of the symptoms and the sensitivity of the patient must be taken into account, but, in general, an individual who is accustomed to binocular vision will be more annoyed than helped by only a few days' occlusion. After a week, however, most individuals will become adjusted to monocular vision and, if their symptoms are due to a binocular anomaly, they may experience relief during the second week of occlusion. After two weeks of monocular occlusion, if a patient reports no change in symptoms, it may be concluded that there is a latent refractive error, especially if the patient reports greater discomfort while doing close work, and, if on removing the occluder, no significant heterophoria is manifest. Marlow points out, that even if the patient does not report relief while one eye is occluded, there is still the possibility that he will get relief by the correction of a muscle imbalance which becomes manifest after occlusion. In fact, Marlow uses the prolonged occlusion test for diagnostic rather than for therapeutic purposes. Lancaster and Bielschowsky, however, have recommended the use of an occluder for therapeutic purposes.

It is very important to examine the patient for a latent phoria immediately upon removing the occluder. One must be careful if a vertical phoria is measured following occlusion, especially if it is a left

hyperphoria following left eye occlusion or a right hyperphoria following right eye occlusion. The alternating, or dissociated, hyperphoria of Bielschowsky[8] is often uncovered by the prolonged occlusion test. This type of hyperphoria, in which the covered eye turns upward, is purely an innervational anomaly and is not amenable to correction by vertical prisms or surgery. Therefore, if a left hyperphoria is manifest following the occlusion of the left eye, no conclusion should yet be formed, but the right eye should be occluded for the same length of time as the left eye. After uncovering the right eye, if a right hyperphoria is manifest, one should realize that he is dealing with a case of alternating, dissociated (non-concomitant) hyperphoria.

Aside from the very important information that monocular occlusion gives relative to the more nearly static "position of rest" of the eyes, it is possible to deduce whether or not aniseikonia plays a part in the patient's symptoms, provided the evidence as to the muscle balance (or imbalance) after prolonged occlusion, is not significant. As a final warning, the negative reaction of the patient should not be considered as conclusive in indicating that no binocular anomaly is present since it must be borne in mind that, to some individuals, the loss of binocular vision may be a greater handicap than were his original symptoms. Therefore, unless the examiner is extremely careful in evaluating the patient's reports, he may be led astray in his diagnosis. It is worth while to list the original chief complaint, or chief symptom, and later to compare this with the patient's chief annoyance while using monocular vision.

V. *Screening Tests for Aniseikonia*

Several men in this country and abroad have tried to develop some sort of screening test for aniseikonia. Most of these so-called "screening tests" consisted of targets to be used in an ordinary stereoscope. It should be realized that the measurement of aniseikonia is a very delicate, often elusive, complicated matter. It is more difficult, even with the best instrumentation, to exactly measure aniseikonia, than it is to exactly measure the phorias or the fusional amplitudes. In recent years, the instrumentation and technique used in the exact measurement of the muscle balance has become much more elaborate, as well as accurate. We cannot conceive of an adequate "screening test" for muscle imbalances any more than for aniseikonia. In general, "screening tests" must be used very judiciously, else many patients will be deprived of

more thorough investigation simply because the "screening test" was negative. The results obtained from any "screening test" should be interpreted in a positive, rather than in a negative manner. That is, if the screening test indicates the possibility of an ocular error, there should be positive advice to have more thorough tests, provided the patient has symptoms; also, even if the screening tests are negative, one should not dismiss the patient who complains of discomfort, with the mere statement: "There is nothing wrong." There is always the possibility that more exact tests would disclose an error which was not evident in the screening tests. The danger in most screening tests is that they are often interpreted as exact measuring devices rather than merely a "screening" method.

We would not consider the "screening test" for visual acuity adequate proof that no refractive error was present and sufficient grounds for the dismissal of a patient with symptoms; neither should we consider from a mere negative screening test for aniseikonia, that the patient does not deserve the benefit of more accurate tests.

Most screening tests for aniseikonia entail the use of a stereoscope, and it should be realized that many optical errors are inherent in most stereoscopes. The optical errors present in most stereoscopes are sufficient to invalidate most of the findings obtained by attempting to match exactly any differences in the relative size of the perceived image of either eye.

A physician, when presented with a baffling case of physical exhaustion, makes all possible tests that his knowledge and equipment allow. If, for example, he eventually suspects tuberculosis, he will try the "screening test" of irritating the arm with a tuberculin injection. Even if the result is not positive, he will, since the cause of the patient's symptoms has not been found, refer the patient to a hospital for more thorough tests for tuberculosis, for instance, an X-ray of the chest.

VI. *Summary*

In this paper, it has been pointed out that:

(1) Aniseikonia is now undergoing the same or similar consideration as was current fifty years ago with respect to astigmatism.

(2) The definition of aniseikonia indicates this condition to be an error in the relative size of the ocular images over and

above normal dioptric or geometric differences.

(3) The clinical importance of aniseikonia is discussed by analogy to the phorias and it is stated that one of the most important criteria of the value of aniseikonia is that its correction has relieved symptoms in cases where other methods had failed. Several case histories are given to illustrate aniseikonia in cases of anisometropia, isometropia and emmetropia; as well as the effect produced by the correction of aniseikonia on depth perception.

(4) Six clues are given, in order of importance, which should assist one in suspected cases of aniseikonia. While the six clues do not constitute a syndrome in the sense that all must be present in order to establish a suspicion of aniseikonia, nevertheless, if the first clue—unrelieved symptoms—is present with any one of the other five, a tentative diagnosis of a possible aniseikonia is justifiable.

(5) The value of screening tests for aniseikonia is discussed, with emphasis being placed on the inaccuracies inherent in the devices used, as well as the unwarranted interpretation of screening tests in general. Caution is urged in forming conclusions based on negative findings; the main point being that, if a patient has unrelieved symptoms, he should not be thwarted in his search for relief by being told that nothing is indicated by the "screening tests." In the final analysis, one should rely upon the all important factor of "symptoms," just as the physician does when presented with an obscure case of exhaustion, by excluding all possible factors, not merely by "screening tests" alone, but by the more thorough specific examination for the anomaly suspected.

REFERENCES

1. Southall, J. P. C.—Introduction to Physiological Optics, p. 148, Oxford Univ. Press, N. Y., 1937.
2. Ogle, Kenneth N.—Relative Sizes of Ocular Images in Asymmetric Convergence. Arch. of Ophth., 22:1046-67, Dec. 1939.
Bannon, Robert E.—Significance of Image Size Differences. The Columbia Optom., Sept. 1941.
3. Carleton, E. H., and Madigan, L. F.—Relationships Between Aniseikonia and Ametropia. Arch. of Ophth., 18:237-47, Aug. 1937.
4. Hughes, Wendell—Aniseikonia in Emmetropia, Am. J. of Ophth., 20:9:887-890, Sept. 1937.

5. Fisher, Harold M.—An Analysis of Statistical Data on Aniseikonia, Am. J. of Optom., 17:8:367-70, Aug. 1940.
6. Ames, A., Jr., and Ogle, K. N.—The Horopter and Corresponding Retinal Points. Ann. Distinguished Serv. Found. Optom. 1:35, 1932.
Ames, A., Jr., Ogle, K. N. and Gliddon, G. H.—Corresponding Retinal Points, The Horopter and Size and Shape of Ocular Images. J. Optom. Soc. of Am., 22:538-574 and 575-632, Oct. and Nov. 1932.
7. Marlow, F. W.—Recent Observations on the Prolonged Occlusion Test. Am. J. Ophth., 16:519, 1933.
8. Bielschowsky, A.—Lectures on Motor Anomalies. Dartmouth College Publications, 1940.
Bannon, Robert E.—Heterophoria and Aniseikonia. Am. J. of Optom., 16:3:96-109, March 1939.

DISCUSSION

DR. HAROLD M. FISHER, NEW YORK CITY: Dr. Bannon's paper is a very interesting, instructive and timely one which deals with a phase of this work which has long been neglected. On the whole optometrists, and ophthalmologists as well, have been guilty of many misconceptions about aniseikonia. As a result of these misconceptions, the entire subject of aniseikonia has often been dismissed without a second thought as a very complex anomaly, quite surpassing ordinary understanding, and found so rarely that it has no practical bearing on the everyday practice of refraction. The various papers on aniseikonia written by members of the Dartmouth Eye Institute and others have not served to dispel these ideas. Here in Dr. Bannon's paper, the subject of aniseikonia is brought home to us.

The clinical significance of aniseikonia has long been established. I believe that the phenomenon is an extremely important one which should be considered routinely as we now consider heterophoria. In fact, it is probable that aniseikonia is a more frequent anomaly than vertical muscle imbalance. I sincerely hope that Dr. Bannon's analogy comparing the present status of aniseikonia with that of astigmatism fifty years ago will be fully justified by future developments in this field, but I trust it will not take fifty years for us to become fully conscious of the importance of aniseikonia.

Before this meeting is turned back to Dr. Bannon for questions from the floor, I would like to comment briefly on his remarks about the diagnosis of aniseikonia and the value of screening tests.

Dr. Bannon has discussed six diagnostic points as aids in the recognition of aniseikonia:

1. Unrelieved symptoms
2. Anisometropia
3. Unequal accommodation
4. Unequal curves or thicknesses of corrective lenses
5. Anomalous space perception
6. Preference for monocular vision.

I believe that every one of these points is valid and should be of considerable use to us in daily practice. The use of occlusion in this connection is especially significant. Aside from its value in the diagnosis of aniseikonia, occlusion deserves special consideration because of the light it may throw on binocular vision in general.

There is one type of case which should be mentioned, though it may have been in Dr. Bannon's mind when he referred to space perception and to monocular vision. Anomalies of binocular vision other than disturbances of space perception may have special significance. We should add to this list one other diagnostic point,—stubborn fusion problem cases. It is possible that many of our orthoptic cases who cannot make satisfactory progress toward normal binocular vision may be prevented from so doing by uncorrected aniseikonia. When we find low stereopsis, tendency to suppression, and reversion to squint, we should certainly consider aniseikonia as a possible cause.

Perhaps it would be well to add here a word of caution in relation to "apparent" aniseikonia. In the course of our routine eye examination, it not uncommonly happens that in comparing the vision of the two eyes the patient will report that the letters appear larger to one eye than the other. Occasionally this observation is brought out in the case history. This must not be interpreted as a reliable indication of the presence of aniseikonia. I have discussed this point in a previous paper on this subject, but feel that it is of sufficient importance to be emphasized here. On numerous occasions I have had the opportunity to actually measure the aniseikonia in patients who reported an apparent size difference, and I have almost invariably found that the measurements did not confirm the patients' observations. The reasons for this discrepancy are not well understood, though it is known that accommodation and convergence give kinesthetic clues to size perception which may not be the same for binocular vision as for monocular vision.

Dr. Bannon is certainly right when he says that history and

symptoms may be preferable to tests in arriving at a reliable diagnosis in our problem cases. If we depend too much upon our instruments we are likely to lose sight of more important features of our case. We may not see the woods because of the trees, so to speak. I think we are agreed that each single finding must be interpreted in the light of the case as a whole. Yet I would like to point out that the reliability of this method of diagnosis depends to a large extent upon the training, experience and judgment of the diagnostician. When we attempt to apply this method to the differential diagnosis of aniseikonia, it must be remembered that not all of us are privileged to have the wide clinical experience in this field enjoyed by Dr. Bannon and his colleagues. Because of our inexperience, we may be inclined to dismiss as unimportant, symptoms which Dr. Bannon would consider strongly suggestive of aniseikonia. When we conscientiously apply this analytic method, we are far less likely to be misled into believing that we have found a simple solution for a complex case than when we depend upon the results of our tests alone, and will be inclined to look further for a solution. Aniseikonia should certainly be considered when there is no other apparent cause for complaints.

In numerous lectures and conversations on aniseikonia over the past few years I have found that there is an almost universal demand among optometrists and ophthalmologists alike for a "screening test" for aniseikonia. These men do not like to refer their patients for an elaborate and costly examination for aniseikonia unless there is reasonable assurance that it will do some good. In other words, they would like to have some way of confirming their diagnosis by actual test before referring the patient.

Any screening test, to be useful, must permit three valid interpretations; definitely positive, definitely negative, and questionable. Thus far, the screening tests that have been proposed for detecting aniseikonia have been of little value because they permitted only the two interpretations which Dr. Bannon mentions; definitely positive or questionable. Thus such tests tell us little because we cannot definitely rule out the presence of aniseikonia. This does not square with my own clinical experience because I have found that it is easier to measure those patients who have no aniseikonia than it is to measure those who do. I cannot quite agree with Dr. Bannon that an adequate screening test for aniseikonia is inconceivable. It may be difficult, if not impossible, to devise

one simple test for this purpose, but I think it is quite probable that a series of functional tests could be evolved to determine the presence or absence of significant aniseikonia with fair reliability.

This question of screening tests is not a simple one and we cannot hope to settle the question or even throw much light on it at this time. I am convinced that this matter deserves serious thought. Tests should be devised and evaluated by clinical use and comparison with tests of known reliability. I am sorry that the Dartmouth Eye Institute has not yet perfected such tests.

For the present the average refractionist, if he would consider aniseikonia in his daily practice, must seek a broader understanding of the subject and then rely upon his own good judgment in suspecting the presence of aniseikonia. I think Dr. Bannon's paper is commendable for the fact that it shows us how to start thinking about aniseikonia.

A SUMMARY OF THE CASES EXAMINED IN THE EYE CLINIC OF THE NEW JERSEY STATE COLONY AT NEW LISBON*

Earl H. Ridgeway, O.D.
Trenton, N. J.

In response to a suggestion by the late Dr. Henry E. Starr, director of the Psychological and Mental Clinic, at Rutgers University, and with the full cooperation of Dr. C. T. Jones and members of his staff at the colony, the work of making a comprehensive study of the ocular conditions of the inmates at the New Lisbon institution was begun in 1934. This study was initiated to ascertain the visual characteristics of the mentally retarded.

As a preliminary to this investigation, a selected number of boys made up of the school group were examined and reported on a year previously. It was believed that the boys in this group would be sufficiently representative to make the essential comparisons which might be necessary. This proved to be true within certain limits. It was soon apparent, that the treatment of the purely visual problems of this group had been considered, if at all, only to the extent of visual acuity findings. The possibilities of arriving at any final conclusions from this work were, at that time, necessarily limited because it represented only one year of observation and no corrections. Further study was definitely justified.

I. OBJECTIVES

It was proposed that a service be established at the colony which would be as complete as possible from the standpoint of diagnosis of functional ocular disorders as would be of value in recommending or instituting proper care. While it was suggested that the service should

*Submitted on January 31, 1942, for publication in the June, 1942, issue of the AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF AMERICAN ACADEMY OF OPTOMETRY.

be diagnostic in nature, corrective measures were undertaken by the service as were necessary to protect the patient's interest and make effective the colony's efforts to establish the possible parolability of its inmates and to otherwise promote the welfare of these boys. Apart from this, and of special interest to the consultant in charge of the investigation, was to be the possible determination of the relationship existing between the ocular developments and efficiencies of individuals at various mental levels.

II. SCOPE

(a) *Examination.* This clinic did not undertake surgical or medical treatment. In cooperation with the resident physician associated with the colony, boys showing signs or symptoms of ocular pathology were hospitalized for medical treatment or for further reference where circumstances required surgical attention. The external examination included, inspection of the lids; bulbar and palpebral conjunctiva; oblique illumination of the cornea and anterior chamber; pupils for regularity of size, shape, and reaction to light, both direct and consensual and response to accommodation; rotations and versions and convergence; transillumination and transvisualization; and interpupillary distances. The examination further included ophthalmoscopic examination of the media, anterior and posterior chambers, iris, lens, retina and such other tests as were necessary to detect the presence of or demonstrate the absence of ocular pathology.

A thorough analysis of the refractive condition and the binocular coordinations were made in every instance where sufficient cooperation of the patients could be obtained. These tests included objective and subjective refraction and disassociation tests for muscular and fusional disturbances. Examination of the visual fields were necessarily omitted with this type of patient. During these examinations the eye clinic staff consisted of one chief consultant and one associate, both experienced and qualified college trained optometrists. In addition, sufficient assistance was provided by the colony staff of nurses, attendants and orderlies. An annual average of approximately 300 boys were examined during the first and second years. This number varied since that time and during the reexamination periods. A complete study of a large number of cases such as here recorded have not previously been made so far as I am able to determine. At the Rutgers University Psychological and Mental Hygiene Clinic, a somewhat similar investigation, dealt with children

of all mental levels, from superior to moron. The object of our investigation there, was to study the ocular conditions present and the effects of their correction among problem cases, such as reading disabilities, behavior problems, nervous irritability, maladjustment, et cetera. From the work of that special investigation we were guided in determining the procedure to be used at New Lisbon.

(b) *Lens Corrections.* It was found in 511 examinations that 310 (60.67%) showed refractive errors.* 202 (39.53%) had visual acuity less than the expected 20/20, while the remainder of 108 (21.14%) had normal visual acuity but refractive errors, which they were able to compensate for, by use of the accommodation or by interpreting satisfactorily their distorted visual images. Normal vision, as usually reported, is not necessarily accompanied by good visual perception. Poor visual sensory capacity may, however, interfere with the efficiency of visual perception. In dealing with these subnormal cases a variety of test objects had to be used, to check one another, for determining Visual Acuity. Among these tests were the familiar Snellen charts of letters and numerals, the Bailey Visual Acuity blocks for illiterates, and the split circle of Landoldt. The latter as adapted to our purpose with protractor proved to be the most accurate and dependable. All test objects were based upon the same maximum visual requirements of 5′ objects with 1′ details. Glasses were approved and fitted to 87 (28.90%) of these 310 cases. These glasses were considered for our purpose only as technical devices for accomplishing the correction. Not all cases showing refractive errors were recommended for glasses. 57 (19.86%) would have been of doubtful value. All glasses used during this investigation were supplied in the clinic under the direct supervision of the examiners. The reasons for advocating this procedure were:

(1) A greater number of patients received corrections than if the boys had to be taken from the institution to be examined or to have the prescriptions filled.

(2) The materials used were of known uniform quality, which was more effectively controlled than would otherwise have been possible if the responsibility had been divided between examiner and opticians.

(3) All lens corrections were inspected for accuracy, and the

*See attached Tables, 1 to 7.

frames branded for future identification if lost, before the patient received them.

(4) No personal advantages were to be gained, and the glasses were obtained at manufacturing cost.

(5) The colony retained complete control of and responsibility for each case. Any possibility of misunderstanding or difficulty through mistakes were eliminated. Because of the inspections, ill-fitting glasses never reached the patient.

All of these factors were of immense importance in dealing with a group of this level. The advantages to the patient are obvious.

(c) *Corrective Treatments.* It is estimated that about 15 per cent of the boys in the upper mental levels might have been benefitted by some form of orthoptic training to a greater or lesser extent. It was our opinion that such treatment could not conveniently and satisfactorily be given in the clinic. Immediate purposes of this investigation did not warrant it even among those cases that could have given us sufficient cooperation. Definite arrangements, therefore, were never completed for this type of correction because of the limited time of the consultants for refraction. Volunteer services could not be used by virtue of special training required in this field. Adequate facilities for this type of treatment were not recommended or made available to the clinic.

III. COST

(a) *Equipment.* The equipment of the New Jersey Optometric Research Clinic in use at Rutgers University was loaned to the colony for the purpose of this investigation. Its value was approximately $1200.00. Supplies such as desk, tables and chairs, were standard furnishings of the hospital. Stationery was supplied by the colony. Certain personal instruments were brought to the service by the refractionist in charge.

(b) *Lens Corrections.* The cost of lens correction was made up of the cost of the lenses, plus the cost of the frames, plus the cost of the case. All of these items were virtually invariable, due to a special production-cost arrangement with the laboratory. The range of prescriptions for patients taken from the files of an average free eye clinic was the basis for the figures used in determining these costs. During the period of the investigation a flat fee of $4.50 was charged by the laboratory for each complete new pair of glasses, regardless of the correction with but

few exceptions. Only first quality toric, six-base-curve lenses were used and mounted in heavy white metal military frames. The annual cost of eye glasses can, therefore, be determined by the turn-over of cases at the clinic and by establishing a program for reexamination. It is most unlikely that this production-cost-fee for glasses could be continued indefinitely without a large turn-over in a controlled laboratory. As for changes in lens prescriptions on reexamination of the boys wearing glasses, it can only be said, that while some may need a change of lenses in a year or two, especially after the first examination, not all of these cases will require changes for much longer periods.

IV. DIAGNOSTIC CRITERIA

For the diagnosis of ocular conditions in these mentally subnormal patients the criteria are the same as for any other group of individuals. This may tend to a conservative estimate as compared with normal groups of individuals especially those working under continual close point application. Of the 511 cases discussed, 310 were found with refractive errors. This figure is low and probably no more than 2/3 of the calculated incidence found in any public eye clinic, although it is probably slightly higher than would be found in a survey of the general population of comparable chronological ages. This fact is rather interesting, inasmuch as the majority of these patients are not high-type physical specimens.

V. SUMMARY

The 511 cases examined fell into the following classifications of mental levels. 3 (.58%) were average; 7 (1.35%) inferior; 49 (9.69%) border-line; 317 (62.03%) moron; 116 (22.70%) imbecile; 2 (.39%) idiot; 17 (3.32%) deferred. The ocular deficiencies were revealed as follows: 310 (60.67%) refractive errors; 202 poor Visual Acuity; 108 objective findings; 29 (.35%) squints; 57 (19.86%) any correction would be of doubtful value; 197 (38.55%) were found to be emmetropic; only 20 (3.91%) showed ocular pathology which included conjunctivitis, ptosis, changes in the structure of the cornea and lens, and traumatic injuries; only 8 (2.50%) of those found to be in need of glasses were already wearing them; 23 (7.42%) were recommended to be left uncorrected either because of the mental grade of the boy or because of his apparent reaction to correction; 9 must be listed as subnormal vision cases included in the blind group at

the school. 287 (56.16%) were finally recommended for corrections for eye glasses; 87 (28.90% were fitted with glasses.

There seems to be a relationship between the visual conditions and the mental levels of the boys. As a result of these findings it appears to be desirable to point out that although the eye findings are of comparative unimportance to the very low grade cases we nevertheless have strong confirmation of their significance to the higher levels. The examiner of these cases did not know the history or rating of any of them. It was only after all refractive work had been completed that the psychological ratings were obtained for analysis. These ratings were obtained from the files of the psychologist, Dr. Wm. B. Needham.

TABLE 1

	Average	Inferior	Border-line	Moron	Imbecile	Idiot	Deferred
Number	3	7	49	317	116	2	17
Ametropia	100%	85.7%	65.3%	59.31%	51.72%	0%	70.59%
Emmetropia	0%	14.2%	34.7%	40.69%	48.28%	100%	29.41%

Although there are not enough of the higher grade boys to be statistically reliable, the findings were consistent with the trend of the other findings and with those established with the higher level groups at the Rutgers Clinic.

It seems highly probable from this summary that, among the attributes associated with retarded or problem children the visual characteristics should receive definite and thorough attention. This consideration must be particularly pertinent in connection with the retardation of the low average groups and in dealing with behavior problems of the high-average groups. Although, it is true, ametropia does exist, sometimes to a rather considerable amount among those not manifesting either behavior or retardation problems, its existence cannot be condoned as it undoubtedly presents its handicaps, through improper coordinations, among the superior children even though immediate subjective effects may not be evident.

TABLE 2

511 EXAMINATIONS SHOW THE FOLLOWING GENERAL OCULAR CLASSIFICATIONS

No. of Persons	*% of Total*		
310	60.67%	ref. errors	202 low Visual Acuity 108 obj. ref.
20	9.35	Squints	
57	19.86	Doubtful Value	34 because of amount 3 because of character 20 because of response
197	38.55	Emmetropia	
8	2.58 (310)	Own glasses	
20	3.91	Pathology (included conjunctivitis, ptosis and changes in the cornea & lens.)	
23	7.42	Uncorrected	17 grade of boy 6 reaction to correction
9	2-imb 2-mn 1-def.R	Subnormal vision (blind)	7 incomplete exam. 3 recom. for sub-N. device 1 partial correction given
297	56.16	Recommended for corrections	
87	28.90	Corrections approved and fitted	

TABLE 3

THE EXAMINATIONS SHOW THE VISUAL STATUS OF THE SEVERAL MENTAL LEVELS AS FOLLOWS:

No.	*% of Total Exams.*	*Rating*	*Ocular Classification*	
3	.58%	Average	2 Subj. V. A.	66.66%
			1 Ob. ref.	33.33%
7	1.35%	Inferior	4 Sub. V.A.	57.15%
			1 Obj. ref.	14.28%
			2 Emm.	28.57%
49	9.59%	Borderline	16 Subj. V.A.	38.80%
			15 Ob. ref.	30.61%
			18 Emm.	36.73%
			4 Path.	8.16%
317	62.03%	Moron	123 Subj. V.A.	38.80%
			65 Ob. ref.	30.61%
			125 Emm.	39.43%
			22 Squint	6.94%
			6 Sub. V.A.	1.89%
			4 Path.	1.26%
116	22.70%	Imbecile	48 Subj. V.A.	41.38%
			23 Ob. ref.	19.83%
			45 Emm.	38.79%
			2 Path.	1.72%
			2 Sub. V.A.	1.72%
			4 Squint	3.45%
2	.39%	Idiot	2 Emm.	66.66%
			1 Path.	33.33%
17	3.32%	Deferred	9 Subj. V.A.	52.94%
			3 Ob. ref.	17.65%
			5 Emm.	29.41%
			1 Path.	5.88%
			2 Squint	11.76%
			1 Sub. V.A.	5.88%

Note: Inasmuch as some cases will be found to have more than one classification (i.e., pathology and refractive conditions) the sum of the percentages reported here and in certain other instances may vary from 100%.

TABLE 4
THOSE EXAMINED SHOW THE FOLLOWING REFRACTIVE CONDITIONS IN THEIR RESPECTIVE MENTAL LEVELS

	Average	Inferior	Border-line	Moron	Imbecile	Idiot	Deferred	Total	%
Total Examined	3	7	49	317	116		17	511	
Hyperopia	1	2	10	43	9		2	67	22.22
	1.49	2.98	14.92	64.18	13.43		2.98		
Myopia			2	14	6		2	24	7.97
			8.33	58.33	25		3.33		
Hyperopic	1		3	20	7		1	32	10.63
Astigmatism	33.12		9.37	62.50	21.87		3.12		
Compound	1	2	11	46	19		5	84	27.92
Correction	1.19	2.38	13.09	54.74	22.61		5.95		
Myopic		1		5	3			9	2.99
Astigmatism		11.11		55.55	33.33				
Dissim.		1	6	60	16		2	85	28.24
		1.18	7.06	70.56	18.81		2.35		
Total Refractive Errors	3	6	32	188	60		12	301	
Emmetropia	0	1	17	129	56		5	208	

TABLE 5
AMETROPIC CASES SHOWING DISTRIBUTION OF REFRACTIVE CONDITIONS IN THE RESPECTIVE MENTAL LEVELS

	Average	Inferior	Border-line	Moron	Imbecile	Idiot	Deferred	Total	%
Total Errors	3	6	32	192	60		12	301	100.00
Hyperopia		1	4	11	2		2	20	23.00
		5%	20%	55%	10%		10%		
Myopia		1	6					7	8.00
		14.28	85.71						
Compound	1	1	2	19	2		1	26	29.88
Corrections	3.85	3.85	7.69	73.07	7.69		3.85		
Hyperopic	1		1	5	2		1	10	11.60
Astigmatism	10%		10%	50%	20%		10%		
Myopic	1		2					3	3.45
Astigmatism	33.33		66.66						
Dissim.			3	15	3			21	24.13
			14.38	71.43	14.38				
Total Correction Errors	2	3	11	58	9		4	87	28.90
Uncorrected	1	3	21	134	51		8	214	

TABLE 6
COMPARISONS OF LENS DIVISIONS AND REFRACTIVE CONDITIONS
(Total Cases showing refractive errors—301)

	1st Div. to 1.5	2nd Div. to 3.0	3rd Div. to 4.5	4th Div. above 4.5	Total	Per Cent
Hyperopia	52	12	2	1	67	22.22%
	77.61%	17.01%	2.98%	1.49%		
Compound	26	33	10	15	84	27.92%
Corrections	30.95%	39.28%	11.90%	17.86%		
Hyperopic	25	5	1	1	32	10.63%
Astigmatism	18.12%	15.63%	3.12%	3.12%		
Myopic	7	1		1	9	2.99%
Astigmatism	77.77%	11.11%		11.11%		
Dissim.	42	23	12	8	85	28.24%
	49.41%	27.05%	14.12%	9.41%		
Totals	168	7	26	30	301	58.90% Total Exam.
Per Cent	53.82%	25.58%	8.64%	9.97%		

TABLE 7

COMPARISONS OF LENS DIVISIONS AND REFRACTIVE CONDITIONS AMONG THE 87 GIVEN CORRECTION

	1st Div. to 1.5	2nd Div. to 3.0	3rd Div. to 4.5	4th Div. above 4.5	Total	Per Cent
Hyperopia	13	5	1	1	20	23.00%
	65.00%	25.00%	5.00%	5.00%		
Compound Corrections	10	8	3	5	26	29.88%
	38.46%	30.77%	11.53%	19.23%		
Hyperopic Astigmatism	9	1			10	11.60%
	90.00%	10.00%				
Myopic Astigmatism	3				3	3.45%
	100.00%					
Dissim.	10	8	1	2	21	24.13%
	47.61%	38.09%	4.76%	9.52%		
Totals	49	23	6	9	87	28.90%
Per Cent	52.32%	26.44%	6.89%	10.34%		

Grateful acknowledgment is made to:

Dr. C. T. Jones, Superintendent of the New Jersey State Colony at New Lisbon, for permission to use the above material.

The late Dr. Henry E. Starr, Director of the Psychological and Mental Hygiene Clinic at Rutgers University for his interest and enthusiasm.

Dr. Jas. Q. Holsopple, State Psychologist, for his unerring and constructive criticisms.

Mr. Scott G. Atkinson, assistant superintendent, and Mr. Ralph Riggins, disciplinarian at New Lisbon who gave every assistance of their offices.

I wish to acknowledge with sincere thanks the technical assistance of Dr. William H. Nicklin of Trenton.

DR. EARL H. RIDGEWAY
140 WEST STATE ST.
TRENTON, N. J.

AMERICAN JOURNAL OF OPTOMETRY
and ARCHIVES *of*
AMERICAN ACADEMY OF OPTOMETRY

Established 1924

Vol. 19 JUNE, 1942 No. 6

EDITORS AND STAFF

Dr. Carel C. Koch . . . . . Editor and Publisher
Dr. Guy L. DuPlessis . . . . . Associate Editor
Dr. Clarence W. Morris . . . . . Associate Editor
Dr. J. Fred Andreae . . . . . Academy Secretary
Lenore Pulver . . . . . Editorial Assistant
Harry Brookins . . . . . Advertising and Production Manager
Lilly L. Koch . . . . . Circulation Manager

Publication Office: 1501-1504 Foshay Tower, 821 Marquette Ave., Minneapolis, Minn.
Academy Office: 901-903 Lexington Building, Baltimore, Maryland.

Annual Subscription, $4.00 in Advance; Canada, $4.50; Foreign, $5.00;
Single Copies, 50c.

Original papers, scientific communications, clinical reports, books for review, and correspondence should be sent to the editor. Subscriptions and applications for single copies should be addressed to the circulation manager. Copy of advertisements must be sent in by the first of the month preceding their appearance. Communications with reference to advertising or other journal business should be addressed to the advertising manager. Academy correspondence should be addressed to the Secretary of the American Academy of Optometry.

Published Monthly by the
AMERICAN JOURNAL OF OPTOMETRY PUBLISHING ASSOCIATION

The American Academy of Optometry and the publishers of this journal have no objection to the reprinting, by other magazines, of any of the articles in this issue, provided such reprints are properly credited to the AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF AMERICAN ACADEMY OF OPTOMETRY.

ABSOLUTE NEAR TESTS

The term "absolute" is used not to dogmatize but to emphasize the point we hope to make, namely: That too strict adherence to the conventional technique of correlating near findings with distance findings hampers the development of technique better designed to cope with near vision problems.

Half-measures are frequently wholly ineffective and near tests which dare not divorce themselves absolutely from distance tests are half-measures which cannot be expected to meet the exigencies of present-day optometric practice.

The hold which the correlation concept has upon the practice of

optometry is the result of chance rather than of deliberate control. And this chance conception has been accepted so uncritically over so long a period as to make any attempt to dislodge it an arduous undertaking. None the less, we shall undertake to do so.

The discovery of radium enabled the physicists to gauge geologic time and estimate that mammals first made their appearance 65 million years ago. Thus the type of eye we are interested in has been in the process of development a long, long time. But the important factor for us to note is that this development was confined almost exclusively to a distance-vision organ.

The chief value of the sense of sight was the means it afforded its owner of seeing an enemy at a distance. The greater the distance at which a stronger opponent could be sighted the better the chances for survival of the weaker animal. The senses of touch, taste, smell and hearing might meet the near problems; but without sight, and superior *distance* sight, the forebears of man would not have survived to pave the way for his evolution.

According to the most conservative estimate of Osborn the human binocular organism has been developing over one million and a half years, with the trend constantly toward improvement of a distance-seeing means.

Yet go back but a few hundred, even a few score, years and still distance-seeing played the dominant part in all but a relatively insignificant portion of his activities.

Result: The human binocular organism developed on the basis of distance-seeing needs.

Paralleling this biological development went the scientific development of optometric procedure. Vision was appraised upon its distance accomplishments. Visual acuity standards were distance standards. Test-letter charts were designed for testing distance visual acuity. Astigmatic test charts were designed for distance use. Objective test findings (ophthalmoscopic, ophthalmometric, and retinoscopic) were interpreted in terms of distance needs.

Result: Optometric procedure developed, and crystallized, on the basis of distance-seeing needs.

Million-year-old biologic habits and hundred-year-old optometric

habits do not lend themselves readily to change. They may be expected to form the basis of a strong opposition to change. They are fulfilling that expectancy. But change they must because the distance concept they nurtured no longer fits the radically changed living and working conditions of today.

From arboreal, to pastoral, to agricultural life where illiteracy was no handicap, millions of human beings were suddenly thrust into industrial, business, and professional life where literacy was indispensable.

Thus without time for evolutionary processes to cope with the situation, the human binocular organism was called upon to read, write and perform innumerable other exacting tasks at near for which the eyes were not fitted, even if perfect according to distance standards, and for which they cannot be fitted, if imperfect, by means of distance tests, however elaborate, nor by near tests which represent only partially modified distance tests.

The outworn conception that near finding must be correlated with distance findings has caused no end of confusion in objective procedure. What are all the conflicting rules in dynamic retinoscopy relating to the allowances for working distance but futile attempts to anticipate the distance subjective correction by manipulating near objective findings? Examine, in this light, the rules of Bestor, Nott, Sheard, and Tait and it will be found that they aim at estimating from dynamic retinoscopic findings what will be accepted by the patient for distance use. And all because the belief is clung to, consciously or unconsciously, that distance tests and distance findings are of primary importance and near tests of secondary importance.

On this basis near tests are not free tests of near-seeing requirements and have reached no higher status than is represented by the simple addition of a pair of equal-power spheres to elaborately deduced distance findings.

Optometry will do well to dedicate herself to the development of unshackled, separate, independent near tests—absolute near-tests as highly refined as her present distance tests—each supreme in its respective field—each equally respected in its respected field.

Drs. Ryer and Hotaling.

TRANSACTIONS OF THE AMERICAN ACADEMY OF OPTOMETRY

by J. Fred Andreae, Secretary

A department devoted to announcements, reports, appointments, organization data, news professional problems and ideals, as these relate to the Academy.

ACADEMY APPOINTMENTS

Dr. Arthur P. Wheelock, President of the Academy, has announced the appointment of the following committees:

Public Relations Committee. Dr. J. G. Shelton, Austin, Texas, Chairman; Dr. O. H. Johnson, Jonesboro, Arkansas, and Dr. Clifford A. Taylor, Toronto, Canada.

Annual Meeting Papers Committee. Dr. D. G. Hummel, Cleveland, Ohio, Chairman; Dr. R. J. Beitel, Jr., Southbridge, Mass.; Dr. Ernest Hutchinson, Los Angeles, California, and Dr. Harold M. Fisher, New York City.

REPORT OF MEETING OF ACADEMY EXECUTIVE COMMITTEE

The Executive Committee of the Academy met on May 16. Those present were: Dr. Arthur P. Wheelock, President, Des Moines, Iowa; Dr. R. M. Hall, Cleveland, Ohio; Dr. D. G. Hummel, Cleveland, Ohio; Dr. Harold M. Fisher, New York City; Dr. W. Edward Dewey, Battle Creek, Michigan; Dr. Carel C. Koch, Minneapolis, Minnesota, and Dr. J. Fred Andreae, Baltimore, Maryland.

RESEARCH PROGRAMS

Academy Research Programs at Dartmouth College and Ohio State University were discussed. A further report on these will be presented to the Academy at a later date.

HERING'S TRANSLATION BY RADDE.

The Executive Committee authorized the Secretary to complete Academy arrangements so that the Carl Radde translation of Hering's monumental work, the *Special Sense and Movement of the Eye,* be published at once. Dr. Carl Radde is a Fellow of the Academy. The work will be published by Williams and Wilkins Company of Baltimore.

This text will be made available to all members of the profession at a cost of $5. Fellows of the Academy who place advance orders for

their copies will receive the book for $3.50. Orders should be sent to the Secretary at once.

ACADEMY MEETING

Because of war conditions it was felt advisable to postpone the Toronto meeting until after hostilities had been concluded. Chairman Hummel of the Program Committee was requested at once to arrange a program for an Academy meeting. The dates and place of this meeting to be decided in the fall, when a fuller understanding of war-time regulations will be available.

THE BOARD OF EXAMINERS

The Executive Committee approved the following resolution:—That the Board of Examiners be composed of fifteen members and arranged as follows: A Chief Examiner. Two examiners from sections designated, all to be appointed by the Executive Council. Sections: North East, South East, North Central, South Central, North West, South West and Canada. Note—It may be found expedient to appoint four members in Canada—two in the West and two in the East. It will be the duty of the Examining Board to review and properly grade all material received from the secretary's office, and to conduct yearly sectional examinations. All examinations to be conducted according to the regulations laid down by the Code of 1940 in the Minutes of the December meeting in Chicago. Each sectional group may call upon the other groups for advice and aid, and travel at the expense of the Academy to other sections if needed. The program as outlined will be put into operation as soon as the detailed plan is worked out, and appointments made.

THE NEW CONSTITUTION AND BY-LAWS

The Executive Committee decided to add two additional classes to the three now in force, relative to Fellowship in the Academy and to eliminate the date "December 1942" when all classes were to be abolished excepting Class 3. This action was taken because war conditions made changes of plans necessary on the part of many prospective Fellows.

The matter of including the Chapter Constitution and By-Laws in the Academy Constitution and By-Laws was given most careful consideration. It was decided that most chapters would prefer to make their own rules and regulations, pertinent to local conditions and this fact applied particularly to those chapters now established and which

chapters now have their own by-laws and regulations. Therefore, it was decided to eliminate the Chapter Constitution and By-Laws from that of the Academy. It was decided, however, that all chapters' By-Laws must have the approval of the Academy.

INQUIRY AND EXPLANATORY NOTES

Through this department answers to technical questions dealing with orthoptic or refractive problems will be presented. These answers here published have been prepared by competent experts. Inquiries on postal cards and anonymous communications will not be noticed.

NO IMMEDIATE SHORTAGE OF PLASTICS FOR SPECTACLE FRAMES

To the Editor: During the present war period in England there has developed a shortage of plastics and for this reason the use of spectacle frames made from these materials has been somewhat limited. Is there at present, or in prospect, a similar shortage of these materials in the United States, and what are our prospects in keeping up the supply of these frames for our patients?

H.C., Boston, Mass.

Answer:* While aware of the shortage of plastics for spectacle frames in England today and the possible implications to the optical industry, *E. I. du Pont de Nemours & Co.*, the country's largest manufacturer of cellulose nitrate plastics for spectacle frames, foresees no immediate falling off in plastic shipments for this purpose, it reported recently.

At the present time the Plastics Department of the Du Pont Company is not experiencing any shortage in its production of "Pyralin" cellulose nitrate plastic for optical use and orders are being serviced as quickly as existing conditions will permit. As in other lines, priority orders take precedence and it is only reasonable to expect that this condition will exist to an even greater extent in the future.

---

*Submitted on May 18, 1942, at the request of the editors, by Miss Florence Kono, of the *Kono Manufacturing Company*, 69-24 Forty-ninth Avenue, Woodside, New York, for publication in the June, 1942, issue of the AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF AMERICAN ACADEMY OF OPTOMETRY.

Raw materials going into the manufacture of "Pyralin" have recently been reduced, virtually eliminating the sale of this plastic for non-essential uses. However, this curtailment is not expected to affect optical production for prescription frames or other plastic production going into essential applications. Production of "Pyralin" sheeting for the manufacture of zyl frames will continue at the present rate, *but* present indications are that optical manufacturers will have an increasingly difficult time obtaining plastics without presenting the necessary priority rating designed for civilian necessities of this kind.

Increasingly popular for prescription wear over the past few years, zyl frames now take on the added job of relieving scarce metals for more direct war needs and keeping the nation's health, safety and production program intact. The average pair of zyl frames on the market today weighs less than ½ ounce. Optical manufacturers, familiar with this type of frame, have little doubt of its ability to fulfill consumer demands in this country, and are just as concerned with the supply as they were the supply of metals some months ago.

Barring unforeseen circumstances, the Du Pont Company expects to have an adequate supply of "Pyralin" on hand to service their optical accounts for the duration. The Du Pont Company and optical manufacturers alike look to "Pyralin" and other cellulose nitrate plastics to conserve and protect the nation's lenses and eyesight at this time. While particularly strong and durable, zyl frames made of cellulose nitrate plastics are light and pleasant to wear and are currently available to optometrists and opticians in a wide range of sizes and flattering styles for prescription use.

In recent conversations with various governmental officials in charge of health supplies, the writer finds that they are fully aware of the necessity for zylo eyewear and have agreed to make every effort to see to it that manufacturers are supplied with all necessary materials for this purpose.

Florence Kono.

BOOK NOTICES AND REVIEWS

Books received are acknowledged by notices in this department. Special selections will be made for more extensive review in the interest of our readers as space permits.

MANUAL OF OCULAR TESTS. The Council on Education and Professional Guidance, The American Optometric Association. Published by the Journal of the American Optometric Association. Wilmac Building, Minneapolis, Minn. 73 pages. Board Covers. $1.50. 1942.

This text presents, in outline form, the ocular clinical tests used by each separate branch of the United States armed forces, along with their particular minimum passing standard. For convenience, data relative to each branch of military service are placed together, making for ease of comparison.

The tests reviewed in this outline are as follows: Visual acuity, depth perception, heterophoria, prism divergence (adduction and abduction), tests of associated parallel movements, external inspection of the eyes, amplitudes of accommodation, angle of convergence, central color vision, visual fields, refraction and ophthalmoscopy.

Six comparative tables dealing with visual efficiency rating, Snellen and Jaeger test types for near point examinations, amplitude of accommodation findings, stereopsis values, and angles of convergence are included. A section is also devoted to tests for malingering.

This work was compiled under the supervision of the following committee: Dr. Charles Sheard, Chairman; Dr. R. M. Hall, Dr. W. I. Brown, Dr. H. W. Ewalt, Jr., Dr. Howard C. Doane, Dr. W. Ezell and Dr. H. A. Imus.

The text has a good bibliography and is, at this time, a useful addition to a reference library.

Carel C. Koch.

Current Comments by Carel C. Koch

A Monthly Department

in which the Editor of the AMERICAN JOURNAL OF OPTOMETRY & ARCHIVES OF THE AMERICAN ACADEMY OF OPTOMETRY will discuss items of news of general interest: such as relate to new instruments, clinical techniques, education, public health, and optometric legislative and organization problems.

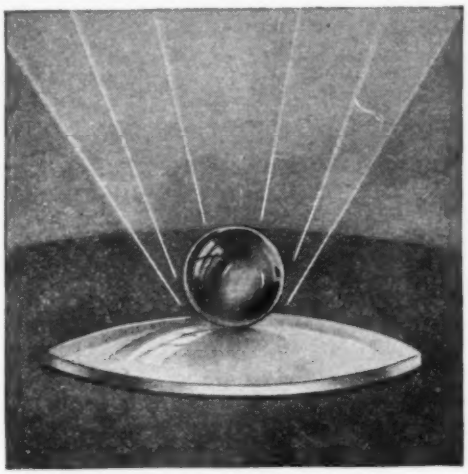
BETTER VISION INSTITUTE LAUNCHES A QUARTER MILLION DOLLAR CAMPAIGN

Under the leadership of the Better Vision Institute, a *Vision for Victory* advertising campaign is now under way. Full page advertisements stressing eye conservation are appearing each month in the SATURDAY EVENING POST, LIFE, TIME, COLLIER'S, AMERICAN MAGAZINE and NATION'S BUSINESS. This quarter million dollar campaign is financed in great part by the cooperative action of eight of the leading manufacturers of optical materials. The firms whose foresight make this splendid campaign possible are, American Optical Company, Bausch & Lomb Optical Company, Bay State Optical Company, Continental Optical Company, Shuron Optical Company, Soft-Lite Lens Company, Titmus Optical Company and the Univis Lens Company.

The advertisements used in this series, stress professional ocular care and are written to foster better inter-professional relations and to improve, in the public mind, the general standing of all professional eye men. The advertisements throughout, will stress the need for professional care—a matter of some significance to those eye physicians and optometrists who prefer to commercialize their refractive practices.

As optometrists we are appreciative of this excellent effort which will arouse added interest in the important subject of eye care. Every practitioner in America will benefit as the result of this campaign and it is hoped that the sponsors will see fit to continue this fine activity well into 1943.

The profession, however, must not let this Better Vision Institute campaign deter, in any sense, its willingness to put into full development its own necessary optometric public relations program. The Better Vision Institute campaign—excellent as it is, and needed now as never before—cannot take the place of an optometric public relations program, which however, can readily be geared to take full advantage of the present fine promotional program now being carried on by the Better Vision Institute.



Resists breakage

Benson Fortified Ophthalmic Lenses

HARDRx Prescription lenses are for general use and are tempered for increased margin of safety against breakage.

BENSAFE Prescription Safety lenses are of heavier construction and toughened for industrial and hazardous sportswear.

Both are of highest quality and are toughened by a controlled heat treatment. Each HardRx lens is subjected to impact of ½" steel ball dropped one meter and Bensafe lens to ¾" steel ball dropped one meter.

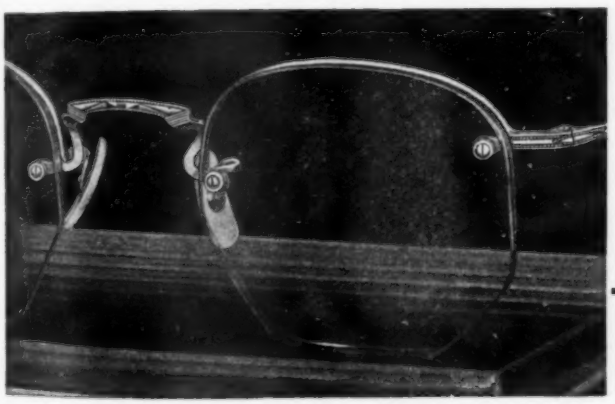
Drop Ball Test for controlled strength

N. P. BENSON OPTICAL CO. Inc.

Established 1913

Main Office: MINNEAPOLIS

Aberdeen - Bismarck - Duluth - La Crosse - Stevens Point - Eau Claire - Wausau - Albert Lea - Winona - Rapid City



GRACEFUL is the word for CUSHION - MOUNT in the popular rimway vogue. Superb construction by the makers of Cushion-Lock mountings.
Lenses are strain - free, breakage-free, wobble-free.

New

The Carlton CUSHION - MOUNT

Improved rimway construction . . . 2-point support maintains lens alignment . . . Backstraps have extra threads to hold screws . . . No metal touches glass . . . Enduring Duratex cushions protect lenses, lock screws . . . Duratex-lined washers insulate lenses from screw-heads . . . Carlton bridge in 10K gold . . . Truflo streamlined temples . . . License-free . . . ASK TO SEE CUSHION-MOUNT.

MINNESOTA OPTICAL COMPANY

MINNESOTA OPTICAL COMPANY

2928 Lyndale Ave. So. -:- MINNEAPOLIS, MINN.

Therminon
REG. U. S. PAT. OFF.
COMFORT AND PROTECTION

Serve to Win!

War-time demands increased efficiency behind the lines as well as on the battle-fronts. Give your patients the comfort and protection of Therminon Lenses . . . formulated to block out 50% of the irritating infra-red radiations while transmitting 92% of the useful visible light. Help them "Serve to win!"

THERMINON LENS CORPORATION
DES MOINES, IOWA

Therminon Lenses are distributed by leading independent jobbers, coast to coast. Ask your supply house representative for a demonstration of all ophthalmic lenses with Thermolux.

Summer Style Leader

A definite summer style leader is the Hibrow Cushion-Mount Rimway Ful-Vue. Note the perfect blending with features and costume. Cushion-Mount gives extra value, too, for it is the only Rimway Ful-Vue construction protected against breakage. Duratex cushions separate lenses from glass, absorbing shocks and strain.

JEFFERY OPTICAL COMPANY

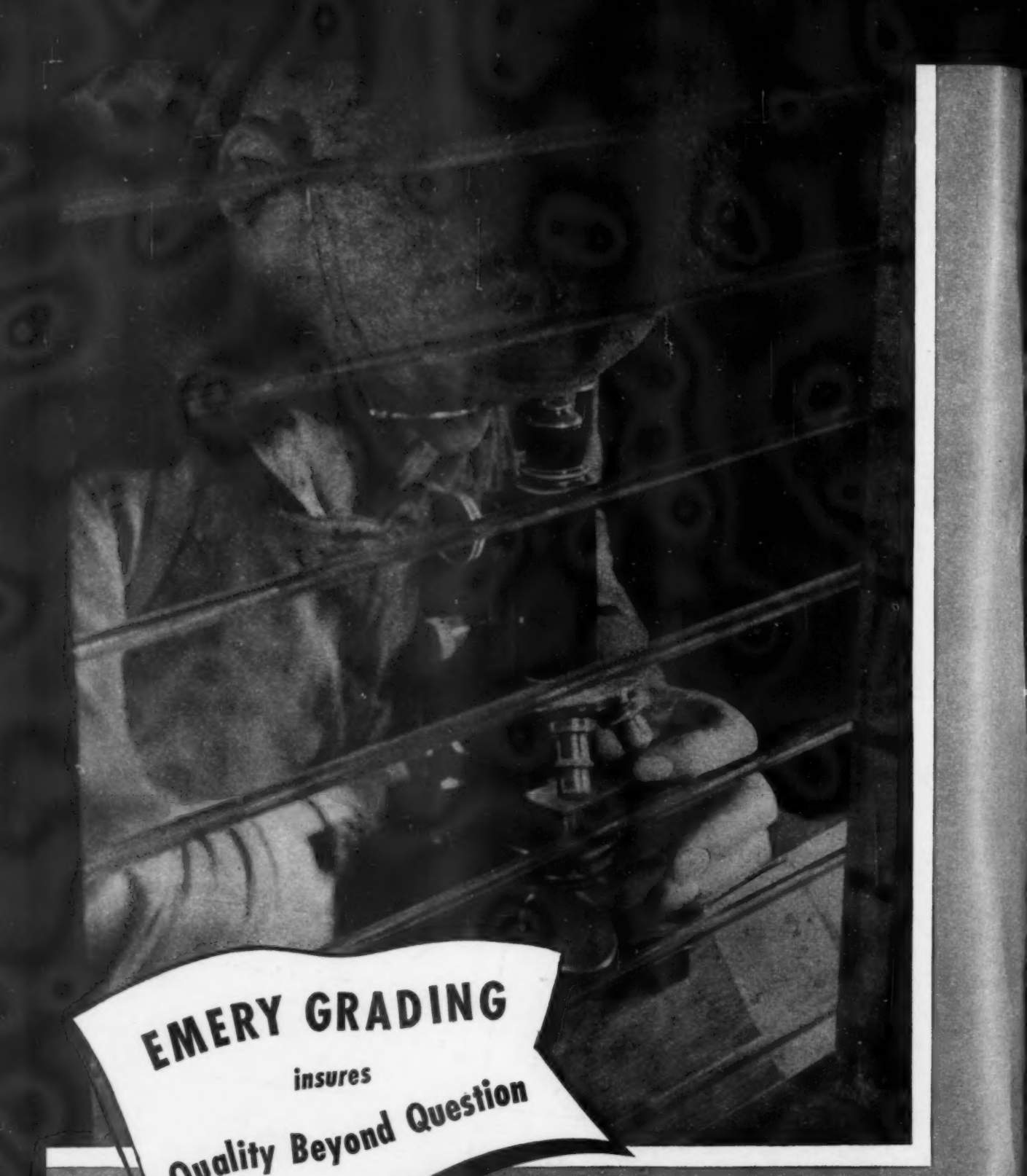
Wholesalers and Manufacturers—Complete Rx Service
Physicians and Surgeons Bldg. Minneapolis, Minn. AT 2469

One Minute Sun Glass Quiz

Which Lenses For Sun Glasses Answer All Of These Questions?

1. Which outdoor lenses are never offered in ready-made form, but may be fitted to any frame or mounting your patient chooses?	**6.** Which outdoor lenses are available in single vision and bifocal forms in three densities?
2. Which outdoor lenses are available from ethical optical sources only?	**7.** Which outdoor lenses can you furnish either plano or prescription —ground, in three densities?
3. Which outdoor lenses are simply darker shades of the absorptive lenses most generally prescribed by leading refractionists for every-day wear?	**8.** Which outdoor lenses are preferred by many because of the distinctive color of the deeper densities?
4. Which outdoor lenses can you recommend to your patients as finest quality ophthalmic lenses — made from start to finish by Bausch & Lomb?	**9.** Which outdoor lenses are available in Orthogon as well as toric curves?
5. Which absorptive lenses offer you a choice of five densities—three expressly intended for outdoor wear?	**10.** Which outdoor lenses are well known to your patients as a result of a strong and effective National Educational Program?

ANSWER: Sport Shade Soft-Lite Lenses . . . available in three densities for outdoor wear; No. 3—29.5% light absorption; No. 4L —46.4% light absorption; No. 4D—64% light absorption.



EMERY GRADING

insures

Quality Beyond Question

Emery for grinding WIDESITE Lenses is processed into closely controlled grades according to particle size. A single oversize grain might ruin the surface of several lenses. Frequent microscope tests of the emery particle are made in order to insure absolutely uniform grains of predetermined size. Thus, even in auxiliary operations the WIDESITE Lens standard of "Quality Beyond Question" is scrupulously maintained.

Shuron WIDESITE